

## A SURVEY OF FRESHWATER FISHES OF ANDAMAN ISLANDS

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A survey of the freshwater fish community was conducted in five large islands of the Andaman archipelago. The objective of the study was to make a complete inventory of freshwater fishes and ascertain the status of fish species reported by Herre (1939). We have collected with cast nets and other fishing traps 2,403 fishes belonging to 33 species in 77 perennial streams and 1 perennial river. 17 species (11 native) were freshwater fishes. *Acenrogobius caninus* is reported here for the first time from the Andaman Islands and it is also a first reporting from Indian inland waters. Five species of freshwater fish have been introduced from mainland India deliberately or accidentally since Herre's survey. The new findings have indicated that more new species can be found in undisturbed regions particularly, the tribal reserves and areas that are inaccessible. However, many of the native species are threatened due to habitat loss and invasive species.

**Key words:** Andamans, freshwater fish, native species, new species, introductions, habitat loss, Jarawa Reserve

## INTRODUCTION

The Andaman and Nicobar Islands are regions of high biological diversity and endemism of many faunal groups. The region should be included with Western Ghats and Sri Lanka as one of the major biodiversity 'hot spots' of the globe (Myers 1990). However, due to lack of accurate inventories, information on many of the taxa found in these islands is inadequate (Pande *et al.* 1991), in particular, the freshwater fishes.

Nevertheless, there were some early contributions on freshwater fish fauna; most of these were fragmentary or restricted to a particular group. These were on diversity (Day 1870, 1875-1878; Hora 1925; Mukerji 1935; Sen 1975), diversity and distribution (Herre 1939, 1941), and a study on Gobiidae (Koumans 1940). Herre (1939) had recorded 112 species of freshwater and littoral fish, which is the most comprehensive work, so far. The present status of these fishes is not clear. Later studies on freshwater fishes of Andamans were compilations of previous surveys (Talwar 1990).

Therefore, considering the importance of this study, the major objectives were: (1) to make a complete inventory of the freshwater fishes in large islands of Andaman group, and (2) to assess the status of the freshwater fishes in comparison with Herre's study (1939).

## STUDY AREA

The study was conducted in North Andaman, Middle Andaman, South Andaman, Rutland and Little Andaman. The Andaman and Nicobar Islands lie between 6° 45'-13° 30' N and 90° 20' - 93° 56' E, off the east coast of India in the southern

part of Bay of Bengal (Srinivasan 1986). The Archipelago comprises of several hundred islands extending over 800 km. Total geographic area of Andaman and Nicobar Islands is 8,249 sq. km of which Andaman group of islands covers 6,408 sq. km.

These islands have a tropical climate with temperatures ranging from 18 °C to 34 °C. The average annual rainfall from the South-West and North-East monsoons ranges from 2,300 mm in the Little Andamans in the South to 3,000 mm in Mayabundar near the North Andamans. The dry season ranges from January to April.

## MATERIAL AND METHODS

## Fish Sampling

We conducted a survey over a 3-year period from 2005 to 2008 in the Andaman Islands. A systematic sampling of the streams has been carried out for freshwater fish species. Streams were walked from downstream to upstream and fish were collected with cast nets of various sizes (2,540 mm x 7 mm and 2,032 mm x 10 mm) at regular interval. For very small fishes, we modified existing methods for collection, such as cloths and bottles. Cloth of sizes 1 m x 0.6 m and 1 m x 0.45 m were used as traps and placed in water near the periphery of the stream mimicking natural substratum. After a preset time the cloth was gently lifted up above water surface by holding it at four corners and fishes were collected. Similarly, plastic bottles were used to catch small fish species. The collected fishes were measured to standard length, weighed and species recorded. A total of 2,403 samples from 77 perennial hill streams and one perennial river have been collected.

Fish identification was carried out using keys developed by Koumans (1953), Masuda *et al.* (1984), Talwar and Jhingran (1991), Pethiyagoda (1991), Kottelat *et al.* (1993) and Jayaram (1999), and with help of taxonomy experts from the Zoological Survey of India at Chennai.

RESULTS

Fish Diversity

A total of 2,403 individuals of 33 species belonging to 20 families and 29 genera (Table 1) were collected from the streams of North Andaman, Middle Andaman, South Andaman, Rutland and Little Andaman (Fig. 1).

Table 1: List of species grouped into families compared with Herre's list

Family	Species	Herre's List
Gobiidae	<i>Glossogobius giuris</i> (Hamilton-Buchanan)	✓
	<i>Sicyopterus microcephalus</i> (Bleeker)	✓
	<i>Sicyopterus</i> sp. (Gill)	×
	<i>Awaous grammepomus</i> (Bleeker)	✓
	<i>Stenogobius gymnopomus</i> (Bleeker)	×
	<i>Redigobius tambujon</i> (Mukerji)	×
	<i>Acentrogobius caninus</i> (Valenciennes)	×
	<i>Schismatogobius</i> sp. (de Beaufort)	×
	<i>Aplocheilichthys panchax</i> (Hamilton-Buchanan)	✓
Channidae	<i>Channa orientalis</i> (Bloch & Schneider)	✓
	<i>Channa striatus</i> (Bloch)	×
Cyprinidae	<i>Paruciosoma daniconius</i> (Hamilton-Buchanan)	✓
Heteropneustidae	<i>Heteropneustes fossilis</i> (Bloch)	×
Clariidae	<i>Clarias batrachus</i> (Linnaeus)	×
Anabantidae	<i>Anabas testudineus</i> (Bloch)	×
Cichlidae	<i>Oreochromis mossambica</i> (Peters)	×
Syngnathidae	<i>Microphis insularis</i> (Hora)	✓
Eleotrididae	<i>Ophioeleotris aporos</i> (Bleeker)	✓
	<i>Butis gymnopomus</i> (Bleeker)	×
	<i>Eleotris fusca</i> (Schneider)	✓
	<i>Ophiocara porocephala</i> (Valenciennes)	✓
	<i>Butis butis</i> (Hamilton-Buchanan)	✓
Megalopidae	<i>Megalops cyprionoides</i> (Broussonet)	✓
Kuhliidae	<i>Kuhlia marginata</i> (Bleeker)	✓
	<i>Kuhlia rupestris</i> (Lacepede)	×
Mugilidae	<i>Liza parsia</i> (Hamilton-Buchanan)	✓
Ambassidae	<i>Ambassis urotaenia</i> (Bleeker)	✓
Apogonidae	<i>Apogon hylasoma</i> (Bleeker)	✓
Scatophagidae	<i>Scatophagus argus</i> (Linnaeus)	✓
Leiognathidae	<i>Leiognathus equulus</i> (Forsskal)	✓
Gerreidae	<i>Gerres filamentosus</i> (Cuvier)	✓
Toxotidae	<i>Toxotes jaculator</i> (Pallas)	✓
Carangidae	<i>Caranx sexfasciatus</i> (Quoy & Gaim)	✓

✓ : recorded    × : not recorded

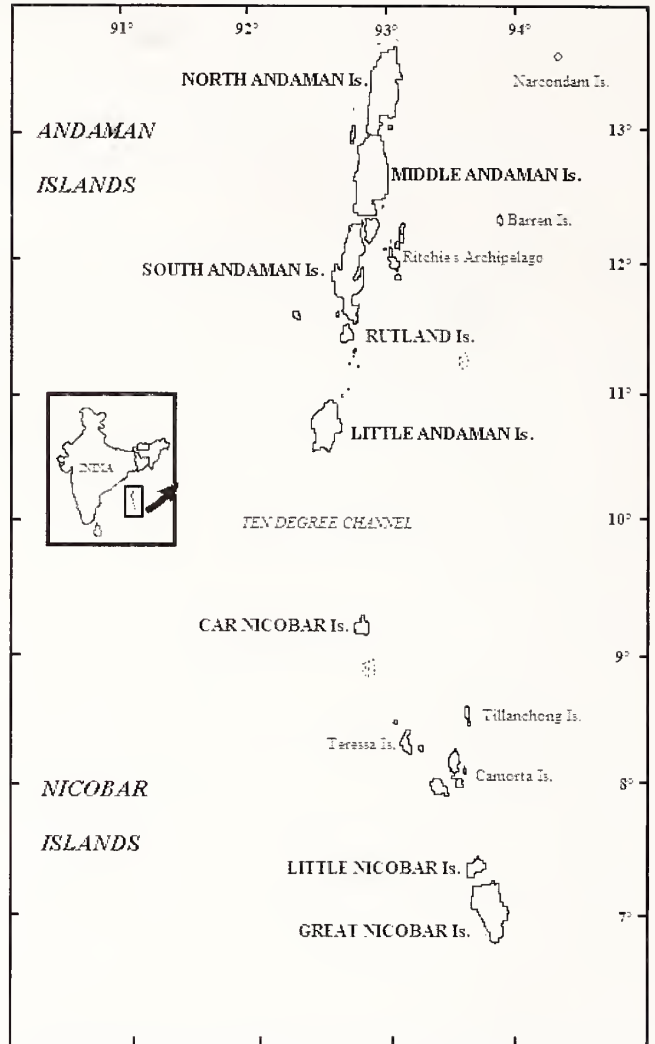


Fig. 1: Andaman and Nicobar Islands and its location in relation to India

Of the 33 species collected, 17 species (11 native) were freshwater fishes (Table 2) and 16 species were secondary freshwater or diadromous species. Some of the specimens that were collected during the survey were later identified as new species belonging to the genus *Sicyopterus* and *Schismatogobius*; genus *Schismatogobius* is the first report from this region. A Gobiid fish *Acentrogobius caninus* hitherto unknown to Andamans and is the first reporting from Indian inland waters.

DISCUSSION

Biotas on islands have high levels of endemism and lower levels of diversity than those on mainland ecosystems (Osborne 2000). This is true in the case of freshwater fishes of Andaman Islands. Of the 33 species recorded by us, only 11 were native freshwater fishes including two new undescribed species. However, the endemism among

**Table 2:** Native, Exotic and Endemic Freshwater species and their Status

Species	Native	Exotic	Endemic	Status
<i>Glossogobius giuris</i>	✓	-	-	Common
<i>Sicyopterus</i>	✓	-	-	Very Common
<i>microcephalus</i>				
<i>Sicyopterus</i> sp.	✓	-	✓	Common
<i>Awaous</i>	✓	-	-	Rare
<i>grammepomus</i>				
<i>Redigobius tambujon</i>	✓	-	-	Rare
<i>Schismatogobius</i> sp.	✓	-	✓	Very Rare
<i>Aplocheilichthys panchax</i>	✓	-	-	Very Common
<i>Channa orientalis</i>	✓	-	-	Common
<i>Microphis insularis</i>	✓	-	✓	Very Rare
<i>Stenogobius</i>	✓	-	-	Very Rare
<i>gymnopomus</i>				
<i>Acentrogobius caninus</i>	✓	-	-	Very Rare
<i>Parluciosoma</i>	-	✓	-	Common
<i>daniconius</i>				
<i>Heteropneustes fossilis</i>	-	✓	-	Common
<i>Clarias batrachus</i>	-	✓	-	Common
<i>Oreochromis</i>	-	✓	-	Common
<i>mossambica</i>				
<i>Anabas testudineus</i>	-	✓	-	Very Rare
<i>Channa striatus</i>	-	✓	-	Very Rare

✓ : recorded    -: not recorded

freshwater fishes was moderately high with 27%. Three species *M. insularis*, *Schismatogobius* sp., and *Sicyopterus* sp. were endemic to the Andamans. About 21 species were reported by Herre (Herre 1939), including 7 freshwater and 14 estuarine species (Table 1). Five species of freshwater fish have been introduced deliberately or accidentally since the Herre's survey (Herre 1939).

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The freshwater fish fauna of this region is somewhat impoverished due to low habitat diversity and its long isolation from continental Asia. There are possibilities that several undiscovered species living in the streams of these islands, particularly in tribal reserves and areas, are inaccessible. However, many of the native species of Andamans are threatened due to habitat loss (Petts 1984; Machado 1994; Glenn *et al.* 1996; Richter *et al.* 1997) and non-native species (Moyle and Leidy 1992; Ward *et al.* 2001). Therefore, it is important to protect freshwater streams in the Andaman Islands as they harbour a unique biodiversity and are the only sources of drinking water for human populations. The tribal reserves such as the Jarawa Reserve are now the only pocket of undisturbed forests and freshwater streams in the Andaman Islands should be kept free from external impact. It is imperative to formulate conservation strategies in order to protect the native fish species and their habitat of Andamans. Otherwise it is likely that several species may go extinct before they are ever discovered by science.

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